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Original article

Utilization of retroperitoneal lymph node dissection for testicular cancer in the United States: Results from the National Cancer Database (1998–2011)

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Abstract

Introduction: Retroperitoneal lymph node dissection (RPLND) for the treatment of testicular cancer is a relatively rare and complex operation that may contribute to differences in utilization. We sought to characterize the use of RPLND between different categories of cancer center facilities in the United States.

Materials and methods: The National Cancer Database was queried for patients with germ cell tumors treated at different types of cancer centers between 1998 and 2011. The proportion of patients who underwent RPLND was stratified by stage and histology and then compared between treatment facilities. RPLND utilization was then compared between facility types as a function of time.

Results: A total of 59,652 patients met inclusion criteria and 5,475 (9.2%) underwent RPLND. The proportion of patients treated with RPLND for non–seminomatous germ cell tumor (NSGCT) was significantly different between cancer center types for all stages ($P < 0.001$) and used most often in academic comprehensive cancer centers. There was no difference in the proportion of RPLND utilization for stage II and III seminoma stratified by treatment facility. There was a significantly decreased trend in the utilization of RPLND for stage I ($P = 0.032$) NSGCT whereas utilization was increased for stage III NSGCT ($P \leq 0.001$) over the study period.

Conclusions: The proportion of patients undergoing RPLND for NSGCT varies significantly by the type of cancer center and is used most often in academic cancer centers. Utilization of RPLND decreased for stage I NSGCT and increased for stage III NSGCTs during the study period.

Keywords: Testicular cancer; Retroperitoneal lymph node dissection

1. Introduction

Testicular cancer is well studied with national and international guidelines available to help standardize therapy across treatment centers [1–4]. Despite the readily available guidelines, treatment variation for patients with seminoma and non–seminomatous germ cell tumors (NSGCT) continue to occur which could reflect patient or provider preferences, the degree of adherence to guidelines, patient-specific clinical factors, or the availability of certain therapies.

Retroperitoneal lymph node dissection, particularly post-chemotherapy RPLND (PC-RPLND), is technically challenging and can often necessitate adjuvant procedures (i.e., nephrectomy), vascular reconstructions, and can be associated with a complicated postoperative recovery [5,6]. Because of the surgical complexity, not all treatment centers can offer RPLND. In fact, some have argued that RPLND should only be performed in high-volume hospitals based on extrapolation of data where associations between overall hospital surgical volume, decreased operative mortality, and lower readmission rates have been demonstrated [7,8].

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The low incidence of testicular cancer necessitating RPLND decreases the number of hospitals capable of establishing "high-volume" centers. This could represent a limiting factor in optimizing outcomes in testicular cancer. We, therefore, sought to characterize the utilization of RPLND among different types of cancer centers in the United States by comparing the rates of RPLND in community cancer programs (CCP), comprehensive community cancer programs (CCCP), and academic comprehensive cancer centers (ACAD).

2. Materials and methods

The National Cancer Database (NCDB), a clinical oncology database cosponsored by the American College of Surgeons and the American Cancer Society, was queried using the International Classification of Disease-Oncology codes for patients with seminoma (9060–9062), NSGCT, and mixed germ cell tumors (9065–9102) between 1998 and 2011. For the purposes of the analysis all mixed germ cell tumors were categorized as NSGCTs and all cases were then analyzed as either a seminomatous or NSGCT.

The NCDB captures approximately 70% of all new cancer diagnoses in the United States and Puerto Rico and contains nearly 30 million historical cases. Cancer center types were categorized per the American College of Surgeons Commission on Cancer (CoC) as either a 1—CCP, 2—CCCP, 3—ACAD, or 4—"other." CCPs are defined as centers with 100 to 500 newly diagnosed cancer cases annually. The full range of diagnostic and treatment services are provided, but referral for care may occur. CCCPs are defined as centers with 500 or more new cancer diagnoses each year and full diagnostic and treatment services are provided on site or by referral. ACADs are defined as centers with 500 or more new cancer cases each year and provide postgraduate medical education in at least 4 program areas including general surgery and internal medicine. CCPs, CCCPs, ACADs, and "other" centers comprised 35%, 39%, 20%, and 6% of hospitals that report to the NCDB and supply 15%, 47%, 35%, and 3% of total cases, respectively [9].

The proportion of patients undergoing RPLND was calculated by dividing the number of patients undergoing RPLND at each cancer center type by the total number of testicular patients with cancer treated at each facility and then stratified by stage. The RPLND proportions were compared between treatment facilities using the chi-square test. The utilization of RPLND was evaluated as a function of time between cancer center facilities using the Cochran-Armitage trend test.

Anatomic templates for RPLND are not captured by the NCDB and therefore not included as a separate variable. Additionally, the NCDB does not record sequencing of treatments, that is, chemotherapy followed by RPLND or vice versa. Therefore, for patients who were diagnosed with stage III NSGCT or stage II to III seminoma and underwent both chemotherapy and RPLND, we assumed the RPLND was performed following chemotherapy, namely a PC-RPLND. Given that both RPLND and chemotherapy can be used as primary treatment for stage I and IIA NSGCT, no assumption was made regarding the sequence of therapies in these disease stages.

Patients were excluded from trend analysis if treated at an "other" designated cancer center, had a known second malignancy, had pathologic stage II disease, had missing treatment information, or underwent rare treatment combinations.

3. Results

We queried the NCDB from 1998 to 2011 for cases of testicular cancer and identified 79,120 patients. Fig. 1 demonstrates the schematic for patient identification with patient inclusion and exclusion criteria and a total of 59,652 (36,832 seminoma and 22,820 NSGCTs) patients were included in the analysis.

A total of 5,475 (9.2%) patients in the entire cohort were treated with RPLND that increases to 19.9% when excluding patient with stage I seminoma patients. The proportion of patients (number of RPLND/number of patients seen) who underwent RPLND from 1998 to 2011 for NSGCT was statistically significantly different for all stages when stratified by cancer center type ($P < 0.001$) as shown in Fig. 2. The proportion of patients treated with RPLND was highest at ACADs followed by CCCPs and then CCPs for all stages. This analysis was repeated, as shown in Fig. 3, for patients with seminoma after excluding patients with stage I seminoma as RPLND is not indicated for this stage of disease. We did not find a significant difference between patients within stage II ($P = 0.29$) or within stage III ($P = 0.30$) seminoma who underwent RPLND when stratified by cancer center type.

During the study period, there was a decrease in both the overall utilization and utilization stratified by cancer center type of RPLND for stage I NSGCT as shown in Fig. 4 ($P = 0.032$). Additionally, for stage III NSGCT there was a significant increase in the overall utilization and utilization within each cancer type for RPLND—doubling for each cancer center type as shown in Fig. 5 ($P < 0.001$).

4. Discussion

RPLND is technically demanding and plays an integral role in the management and therapeutic strategy for patients with testicular cancer. We found significant differences in the utilization rate of RPLND for all stages of NSGCT between types of cancer centers. In fact, the utilization rate of RPLND was approximately 3 times higher for ACADs compared with CCPs. This was somewhat surprising considering that our study only evaluated CoC-accredited cancer centers. These centers adhere to strict accreditation